

A New Formation Flying/Satellite Swarm Concept

Completed Technology Project (2014 - 2015)



Project Introduction

NASA needs a method of not only propelling and rotating small satellites, but also to track their position and orientation. We propose a concept that will, for the first time, demonstrate both tracking and propulsion simultaneously in the same system.

NASA plans to build a lab bench operational system capable of tracking the position and orientation of small satellites as well as producing forces and torques on them. The goal is to be able to direct a satellite to move to various positions and orientations and then see how well it can accomplish this. The position resolution achieved is a major goal of the project.

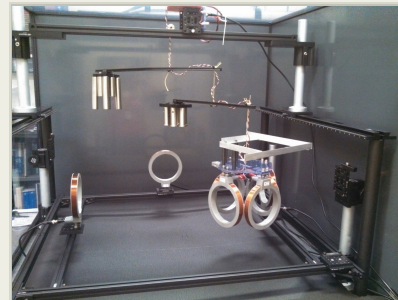
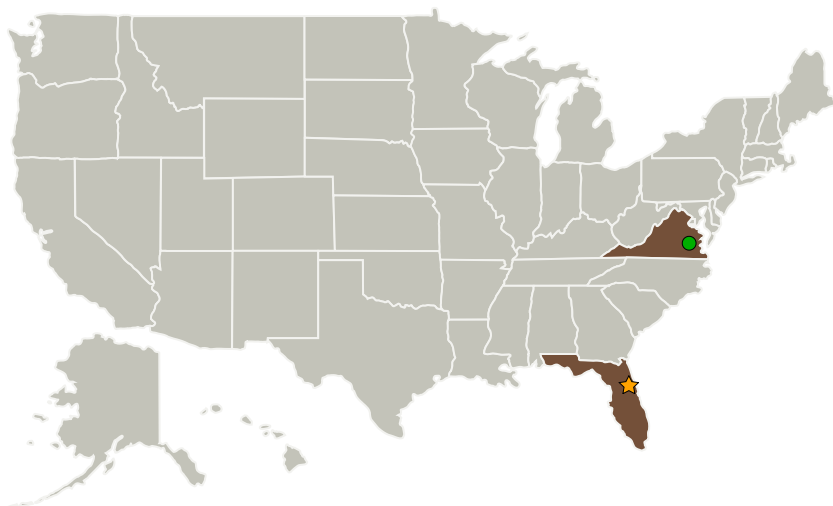
We have previously demonstrated one directional forces and single torques to a satellite. We analyzed this and published a technique to extend it to more dimensions. This project began on May 1st 2014. As results are developed more information will be provided to this site.

Anticipated Benefits

This technology would benefit NASA missions with free flying or near field satellite. Future satellite swarms and formation flying systems may use this technology to provide both forces and torques as well as tracking information.

The Defense Advanced Research Projects Agency (DARPA) has shown interest in this type of technology. Contactless tracking of a system may have commercial applications. Some of NASAs prior work in this area has been patented and commercialized.

Primary U.S. Work Locations and Key Partners



Mock-satellite with four coils in enclosure with drive coils to test electro-dynamic force-tracking concepts.

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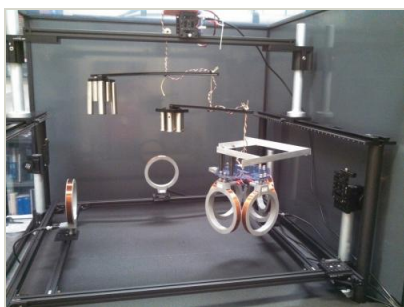


Organizations Performing Work	Role	Type	Location
★ Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations

Florida	Virginia
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Images



Formation Flying Test System

Mock-satellite with four coils in enclosure with drive coils to test electro-dynamic force-tracking concepts.

(<https://techport.nasa.gov/image/4037>)

Links

Alternating magnetic field forces for satellite formation flying
(<http://www.sciencedirect.com/science/article/pii/S0094576512004638>)

KSC-13961
(no url provided)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Center Innovation Fund: KSC CIF

Project Management

Program Director:

Michael R Lapointe

Program Manager:

Barbara L Brown

Project Manager:

Robert C Youngquist

Principal Investigator:

Robert C Youngquist

Co-Investigator:

Mary R Skow

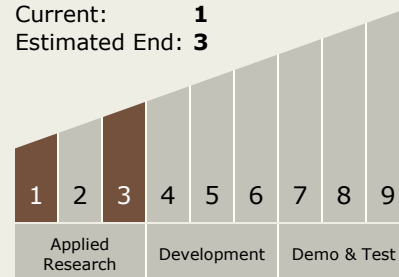
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Technology Maturity (TRL)

Start: **1**
Current: **1**
Estimated End: **3**



Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
 - └ TX05.3 Internetworking
 - └ TX05.3.1 Disruption Tolerant Networking